



Project No.: TM-2203000471P
Report No.: TMWK2203001095KR

FCC ID: ELVATVB

Page: 1 / 39
Rev.: 00

FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Transmitter

Model Number: 7051

Trade Name: N/A

Issued to

Nutek Corporation

No.167, Lane 235, Bauchiau Rd., Xindian District, New Taipei City ,Taiwan

Issued by

Compliance Certification Services Inc.

Wugu Laboratory

No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City, Taiwan. (R.O.C.)

Issued Date: April 28, 2022

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



Report No.: TMWK2203001095KR

Page: 2 / 39

Rev.: 00

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 28, 2022	Initial Issue	ALL	Allison Chen

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION	4
2. TEST SUMMARY	5
3. EUT DESCRIPTION.....	6
4. TEST METHODOLOGY.....	7
4.1 EUT CONFIGURATION	7
4.2 DESCRIPTION OF TEST MODES.....	7
4.3 THE WORST MODE OF MEASUREMENT	8
4.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS	9
5. INSTRUMENT CALIBRATION	10
5.1 MEASURING INSTRUMENT CALIBRATION	10
5.2 MEASUREMENT EQUIPMENT USED	10
5.3 MEASUREMENT UNCERTAINTY	11
6. FACILITIES AND ACCREDITATIONS	12
6.1 FACILITIES	12
7. SETUP OF EQUIPMENT UNDER TEST	13
7.1 SETUP CONFIGURATION OF EUT	13
7.2 SUPPORT EQUIPMENT	13
8. FCC PART 15.249 REQUIREMENTS	14
8.1 20DB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)	14
8.2 BAND EDGES AND FUNDAMENTAL MEASUREMENT	17
8.3 SPURIOUS EMISSION	26
8.4 POWERLINE CONDUCTED EMISSIONS	38
APPENDIX A PHOTOGRAPHS OF TEST SETUP	A-1
APPENDIX 1 - PHOTOGRAPHS OF EUT	



Report No.: TMWK2203001095KR

Page: 4 / 39

Rev.: 00

1. TEST RESULT CERTIFICATION

Applicant: Nutek Corporation
No.167, Lane 235, Bauchiau Rd., Xindian District, New Taipei City, Taiwan

Manufacturer: Nutek Corporation
No.167, Lane 235, Bauchiau Rd., Xindian District, New Taipei City, Taiwan

Equipment Under Test: Transmitter

Trade Name: N/A

Model No.: 7051

Date of Test: April 8 ~ 14, 2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	Compliance
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

We hereby certify that:

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report. The test Report of full or partial shall not copy. Without written approval of CCS. Inc. The sample selected for test was production product and was provided by manufacturer.

Approved by:

Kevin Tsai
Deputy Manager
Compliance Certification Services Inc.

2. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	3	Antenna Requirement	Pass
2.1049	8.1	20 dB Bandwidth	Pass
-	8.1	Occupied Bandwidth (99%)	Pass
15.209 15.249(a)	8.2	Band Edge and Fundamental measurement	Pass
15.249(a)	8.3	Radiation Spurious Emission	Pass
15.207(a)	8.4	Powerline Conducted Emission	Not applicable

3. EUT DESCRIPTION

Product	Transmitter					
Trade Name	N/A					
Model Number	7051					
Model Discrepancy	N/A					
Received Date	March 22, 2022					
Power Supply	EUT power by Lithium Battery. (DC 3V)					
Modulation Technique	ASK					
Antenna Specification	PCB Antenna / Gain: 0 dBi					
Frequency Range	CH	FREQ.(MHz)	CH	FREQ.(MHz)	CH	FREQ.(MHz)
	37	2402	12	2430	26	2458
	00	2404	13	2432	27	2460
	01	2406	14	2434	28	2462
	02	2408	15	2436	29	2464
	03	2410	16	2438	30	2466
	04	2412	17	2440	31	2468
	05	2414	18	2442	32	2470
	06	2416	19	2444	33	2472
	07	2418	20	2446	34	2474
	08	2420	21	2448	35	2476
	09	2422	22	2450	36	2478
	10	2424	23	2452	39	2480
	38	2426	24	2454	-	-
	11	2428	25	2456	-	-

Remark:

- For more details, please refer to the User's manual of the EUT.
- Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

4. TEST METHODOLOGY

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.249.

4.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 DESCRIPTION OF TEST MODES

The EUT (model: 7051) had been tested under operating condition.

Channel Low (2402MHz), Channel Mid (2440MHz) and Channel High (2480MHz) were chosen for the final testing.

4.3 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Battery
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Battery
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report

4.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

5. INSTRUMENT CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Loop Probe	LANGER EMV-TECHNIK	RF-R 50-1	02-2644	01/24/2022	01/23/2023
EXA Signal Analyzer	KEYSIGHT	N9010B	MY55460167	09/07/2021	09/06/2022
Software	N/A				

3M 966 Chamber Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
Band Reject Filters	MICRO TRONICS	BRM 50702	112	11/23/2021	11/22/2022
Bilog Antenna	Sunol Sciences	JB3	A030105	07/19/2021	07/18/2022
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/23/2022	02/22/2023
Coaxial Cable	EMCI	EMC105	190914+1111	09/17/2021	09/16/2022
Coaxial Cable	Woken	J-1099	201709090004	12/23/2021	12/22/2022
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	12/28/2021	12/27/2022
Horn Antenna	ETS LINDGREN	3116	00026370	11/30/2021	11/29/2022
Horn Antenna	ETS LINDGREN	3117	00055165	07/29/2021	07/28/2022
K Type Cable	Huber+Suhner	SUCOFLEX 102	29406/2	12/05/2021	12/04/2022
Pre-Amplifier	EMEC	EM330	060609	02/23/2022	02/22/2023
Pre-Amplifier	HP	8449B	3008A00965	12/24/2021	12/23/2022
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	12/06/2021	12/05/2022
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Software	e3 210616				

Remark:

- Each piece of equipment is scheduled for calibration once a year.
- N.C.R. = No Calibration Request.

5.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 9K~30M	+/- 2.25
3M Semi Anechoic Chamber / 30M~1G (Horizontally)	+/- 3.91
3M Semi Anechoic Chamber / 30M~1G (Vertically)	+/- 4.57
3M Semi Anechoic Chamber / 1G~6G	+/- 5.20
3M Semi Anechoic Chamber / 6G~18G	+/- 5.18
3M Semi Anechoic Chamber / 18G~40G	+/- 3.68

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Tel: 886-2-2299-9720 / Fax: 886-2-2299-9721

7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

7.2 SUPPORT EQUIPMENT

No	Device Type	Brand	Model	Series No.	FCC ID
	N/A				

Remark:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8. FCC PART 15.249 REQUIREMENTS

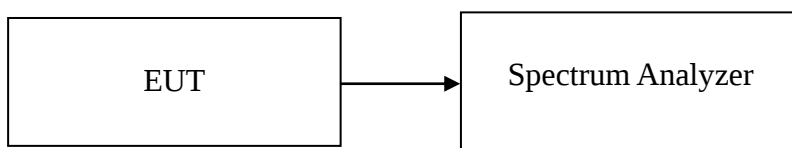
8.1 20dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

LIMIT

20 dB Bandwidth : For reporting purposes only.

Occupied Bandwidth(99%) : For reporting purposes only.

Test Configuration



TEST PROCEDURE

Test method Refer as ANSI C63.10: 2013 clause 6.9.2

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 20 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 20 dB Bandwidth and 99% Bandwidth. in the test report.

TEST RESULTS

Compliance

Test Data

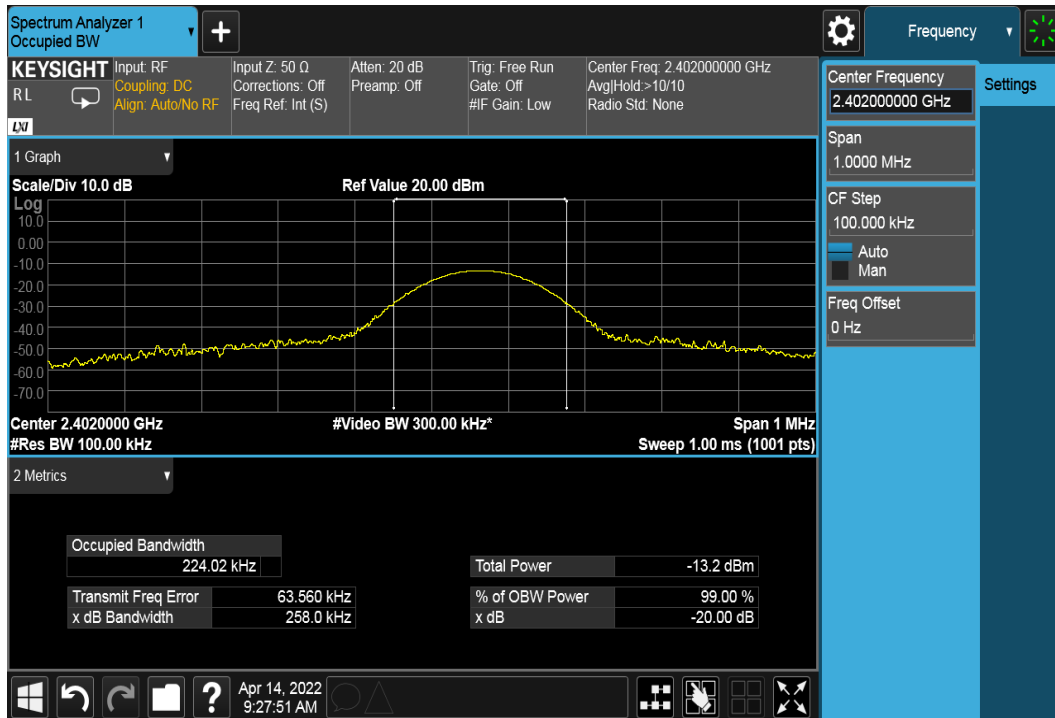
Temperature: 24.2°C **Test Date:** April 14, 2022
Humidity: 53% RH **Tested by:** Jack Chen

Test mode: ANT+ mode / 2402 ~ 2480MHz			
Channel	Frequency (MHz)	OBW(99%) (MHz)	20dB BW (MHz)
Low	2402	0.2240	0.2580
Mid	2440	0.2267	0.2559
High	2480	0.2303	0.2627

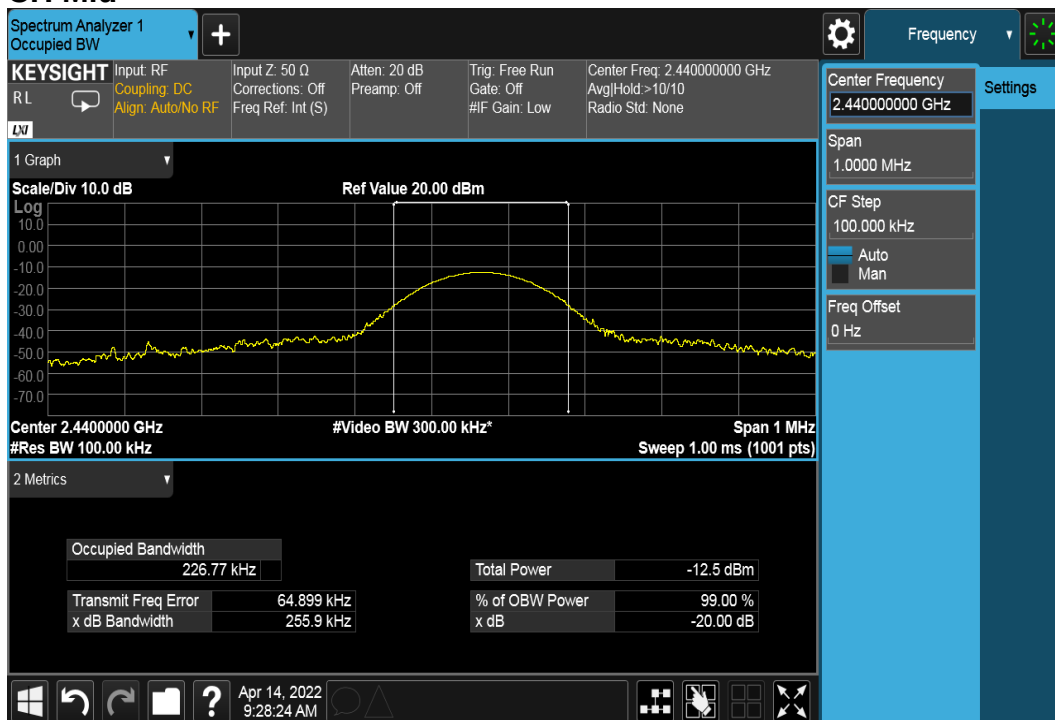
Test Plot

OBW (99%OBW and 20dB)

CH Low



CH Mid

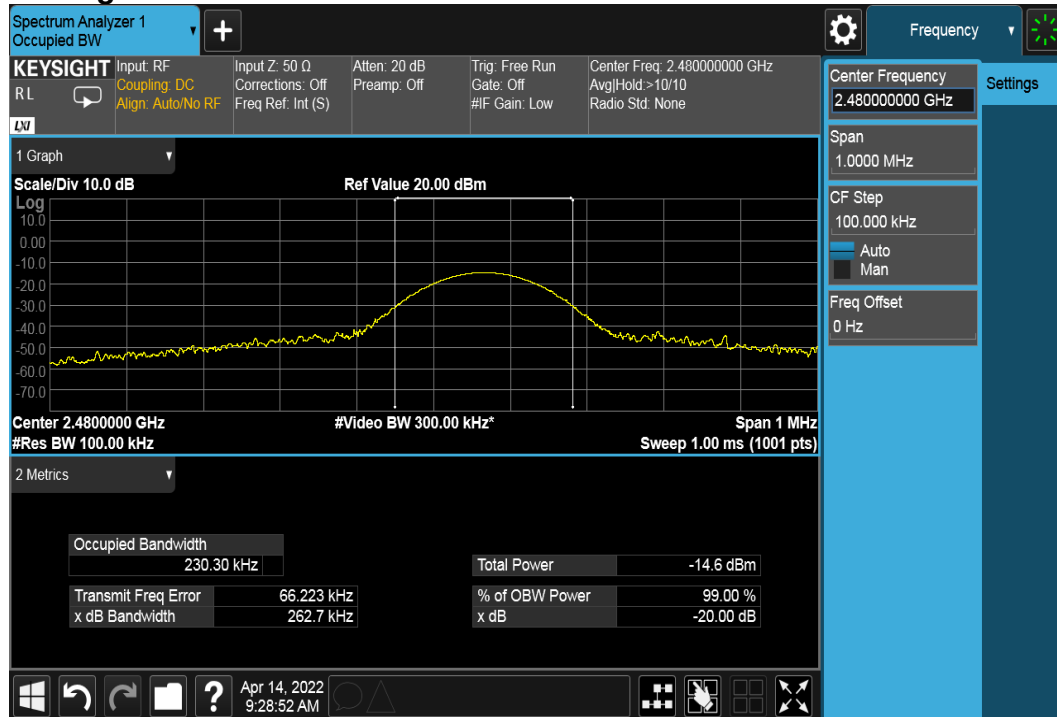




Report No.: TMWK2203001095KR

Page: 16 / 39
Rev.: 00

CH High



8.2 BAND EDGES AND FUNDAMENTAL MEASUREMENT

LIMIT

According to §15.209, §15.249(a)

(1) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

* Field strength limits are specified at a distance of 3 meters

Fundamental Limit Conversion		
Average (mV/m) at 3M	Average (dBuV/m) at 3M	Peak (dBuV/m) at 3M
50	93.98	113.98

Harmonic Limit Conversion		
Average (uV/m) at 3M	Average (dBuV/m) at 3M	Peak (dBuV/m) at 1M
500	53.97	73.97

*(Limit=20LOG(500)=53.79 dBuV/m)

(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209(follow the table), whichever is the lesser attenuation

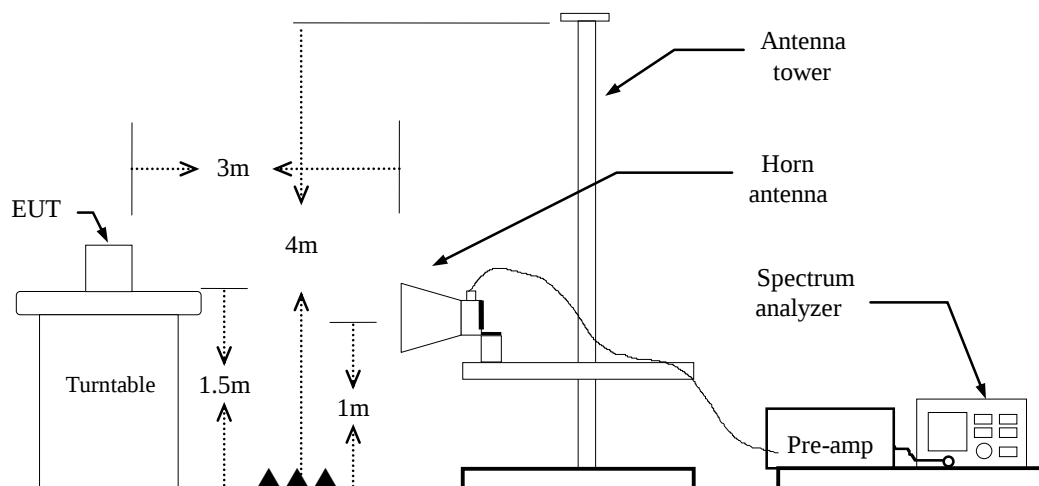
Below 30 MHz

Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	30
1.705-30 MHz	30	30

Above 30 MHz

Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz,
if duty cycle $\geq 98\%$, VBW=10Hz.
if duty cycle $< 98\%$ VBW=1/T.
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.
6. Result = Spectrum Reading + cable loss(spectrum to Amp) - Amp Gain + Cable loss(Amp to receive Ant)+ Receive Ant

TEST RESULTS

Refer to attach spectrum analyzer data chart.

Band Edges

Temperature: 21.1°C

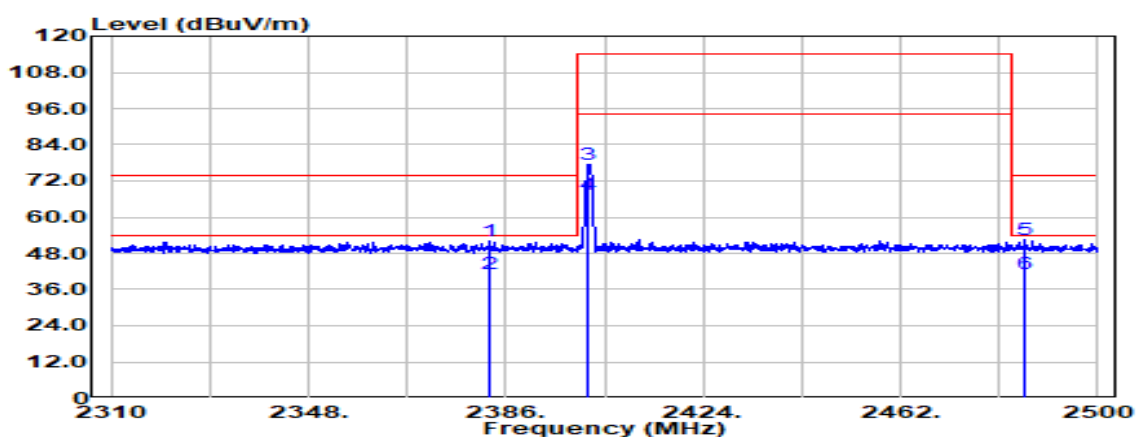
Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Test Mode: CH Low

Antenna Pol.: Vertical



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2382.960	Peak	39.50	12.44	51.95	74.00	-22.05
2382.960	Average	28.64	12.44	41.08	54.00	-12.92
2402.000	Peak	64.85	12.54	77.40	114.00	-36.60
2402.000	Average	55.05	12.54	67.60	94.00	-26.40
2486.035	Peak	39.22	13.10	52.32	74.00	-21.68
2486.035	Average	28.23	13.10	41.32	54.00	-12.68



Report No.: TMWK2203001095KR

Page: 21 / 39
Rev.: 00

Temperature: 21.1°C

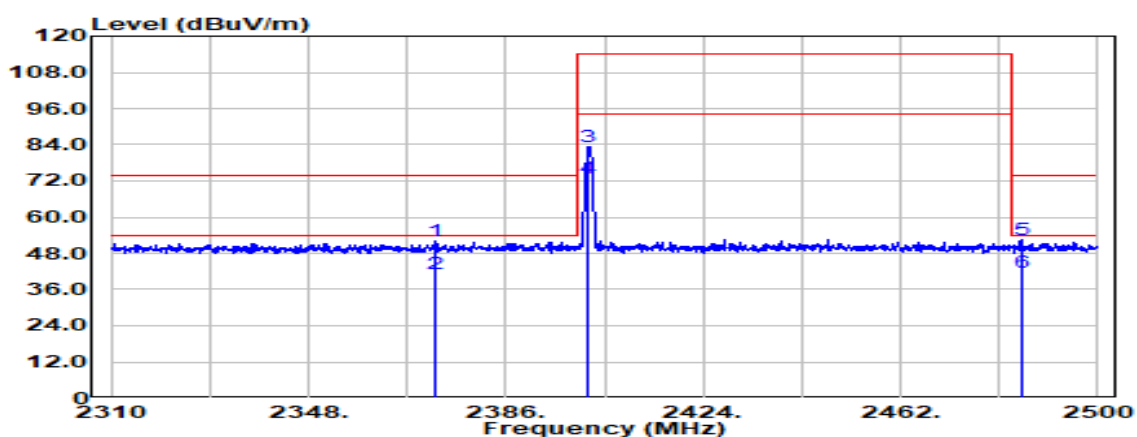
Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Test Mode: CH Low

Antenna Pol.: Horizontal



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2372.605	Peak	39.65	12.39	52.04	74.00	-21.96
2372.605	Average	28.76	12.39	41.15	54.00	-12.85
2402.000	Peak	70.76	12.54	83.31	114.00	-30.69
2402.000	Average	60.15	12.54	72.69	94.00	-21.31
2485.180	Peak	39.22	13.09	52.31	74.00	-21.69
2485.180	Average	28.58	13.09	41.67	54.00	-12.33

Report No.: TMWK2203001095KR

Page: 22 / 39
Rev.: 00

Temperature: 21.1°C

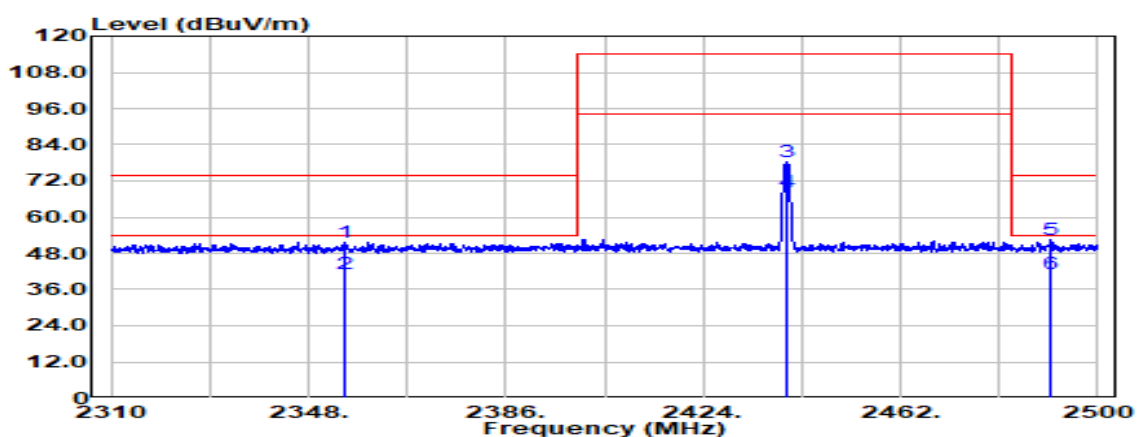
Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Test Mode: CH Mid

Antenna Pol.: Vertical



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2354.935	Peak	39.54	12.30	51.84	74.00	-22.16
2354.935	Average	28.81	12.30	41.12	54.00	-12.88
2440.000	Peak	65.58	12.79	78.37	114.00	-35.63
2440.000	Average	55.71	12.79	68.50	94.00	-25.50
2490.785	Peak	39.34	13.13	52.47	74.00	-21.53
2490.785	Average	28.20	13.13	41.33	54.00	-12.67

Report No.: TMWK2203001095KR

Page: 23 / 39

Rev.: 00

Temperature: 21.1°C

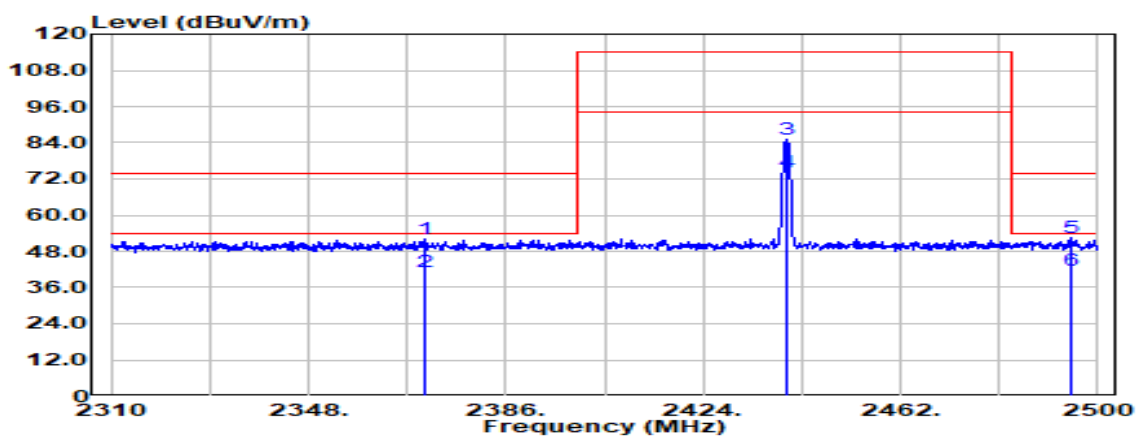
Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Test Mode: CH Mid

Antenna Pol.: Horizontal



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2370.610	Peak	39.48	12.38	51.86	74.00	-22.14
2370.610	Average	28.78	12.38	41.16	54.00	-12.84
2440.000	Peak	72.41	12.79	85.20	114.00	-28.80
2440.000	Average	61.52	12.79	74.30	94.00	-19.70
2494.680	Peak	39.17	13.15	52.33	74.00	-21.67
2494.680	Average	28.40	13.15	41.56	54.00	-12.44

Report No.: TMWK2203001095KR

Page: 24 / 39
Rev.: 00

Temperature: 21.1°C

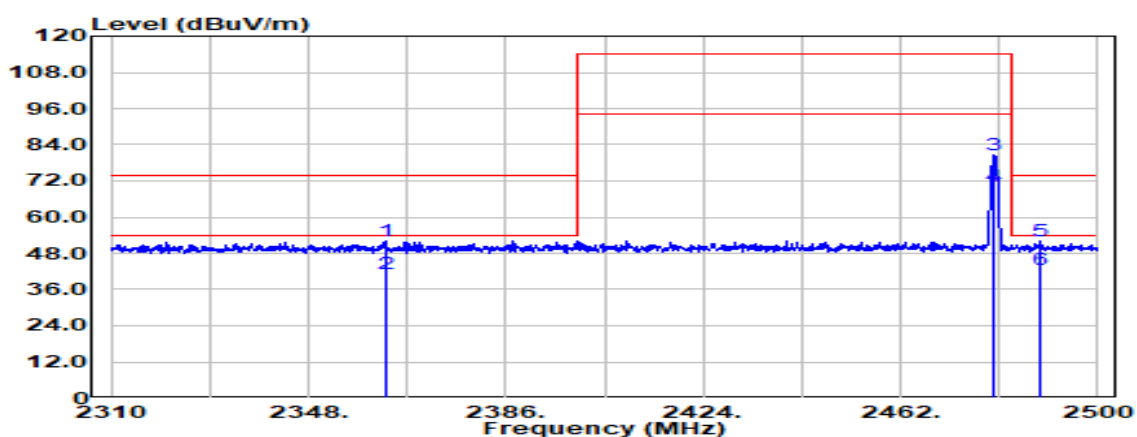
Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Test Mode: CH High

Antenna Pol.: Vertical



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2362.725	Peak	39.68	12.34	52.02	74.00	-21.98
2362.725	Average	28.79	12.34	41.13	54.00	-12.87
2480.000	Peak	67.48	13.05	80.53	114.00	-33.47
2480.000	Average	57.28	13.05	70.34	94.00	-23.66
2488.980	Peak	39.08	13.12	52.19	74.00	-21.81
2488.980	Average	29.44	13.12	42.56	54.00	-11.44

Report No.: TMWK2203001095KR

Page: 25 / 39
Rev.: 00

Temperature: 21.1°C

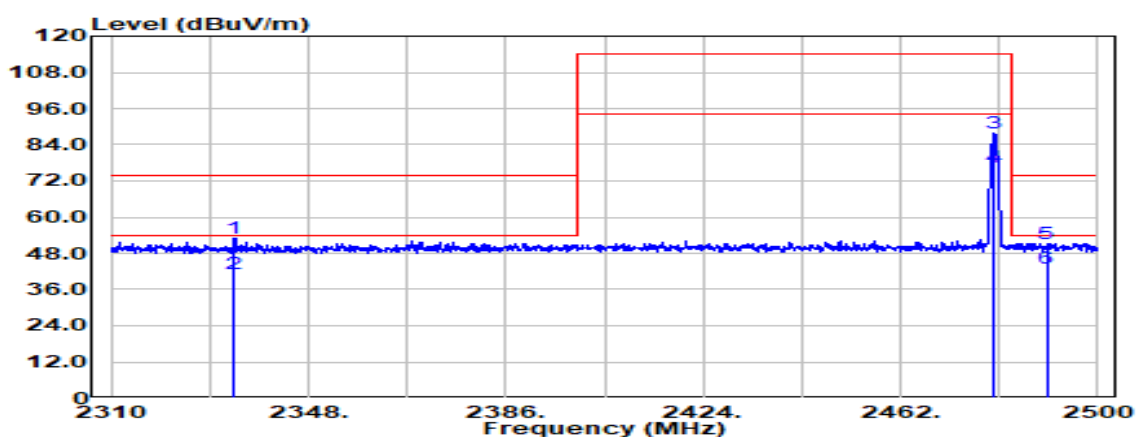
Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Test Mode: CH High

Antenna Pol.: Horizontal



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV/m	Limit @3m dBμV/m	Margin dB
2333.750	Peak	40.88	12.25	53.13	74.00	-20.87
2333.750	Average	29.06	12.25	41.31	54.00	-12.69
2480.000	Peak	74.76	13.05	87.81	114.00	-26.19
2480.000	Average	63.55	13.05	76.60	94.00	-17.40
2490.120	Peak	38.22	13.12	51.34	74.00	-22.66
2490.120	Average	30.02	13.12	43.14	54.00	-10.86

8.3 SPURIOUS EMISSION

LIMIT

According to §15.209, §15.249(a)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209(follow the table), whichever is the lesser attenuation

Below 30 MHz

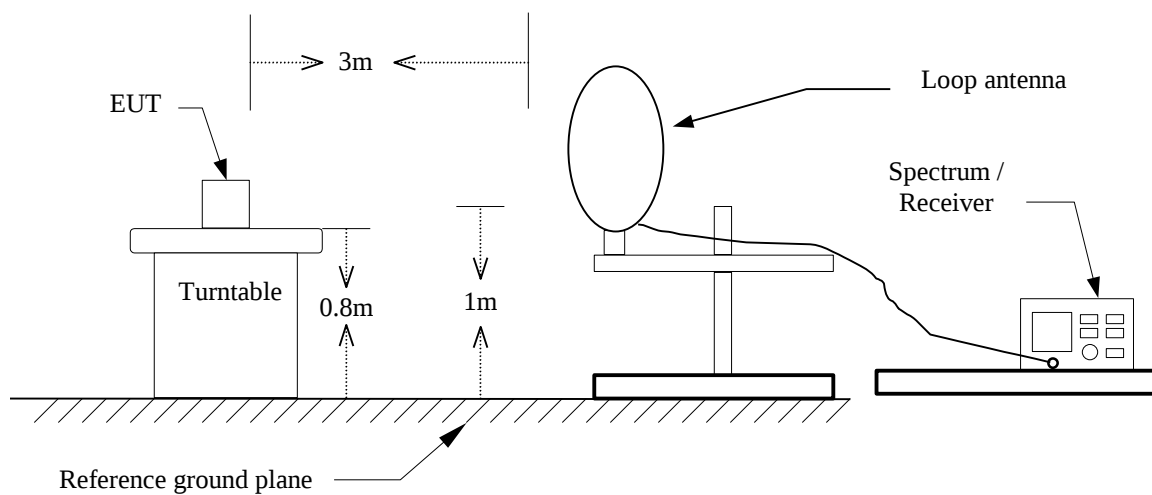
Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	30
1.705-30 MHz	30	30

Above 30 MHz

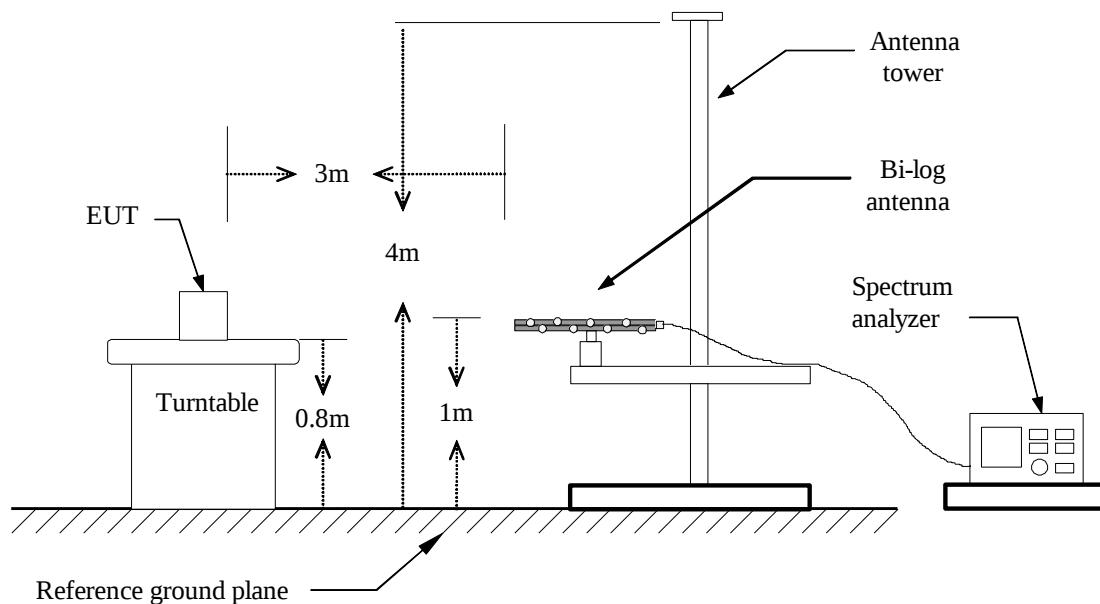
Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

9kHz ~ 30MHz



30MHz ~ 1GHz

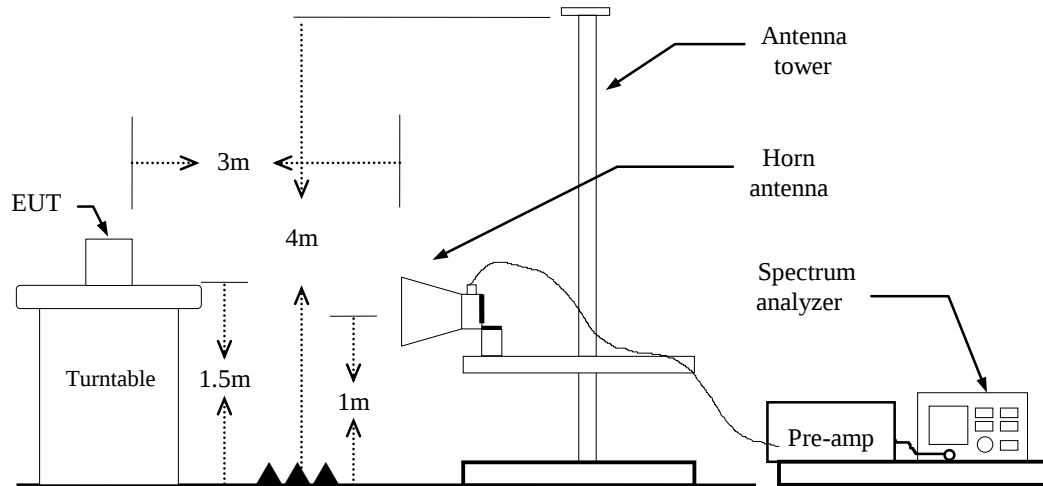


Report No.: TMWK2203001095KR

Page: 28 / 39

Rev.: 00

Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m high and below 1 GHz is 0.8m high above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a)PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

(b)AVERAGE: RBW=1MHz,

if duty cycle $\geq$ 98%, VBW=10Hz.

if duty cycle<98% VBW=1/T.

7. Repeat above procedures until the measurements for all frequencies are complete.
8. Result = Spectrum Reading + cable loss(spectrum to Amp) - Amp Gain + Cable loss(Amp to receive Ant)+ Receive Ant

Note: We checked every harmonics frequencies from Fundamental frequencies with reduced VBW, and we mark a point to prove pass or not if we find any emission. For this case, there are no emissions hidden in the noise floor.

Below 1 GHz**Operation Mode:** Normal Link**Polarity:**

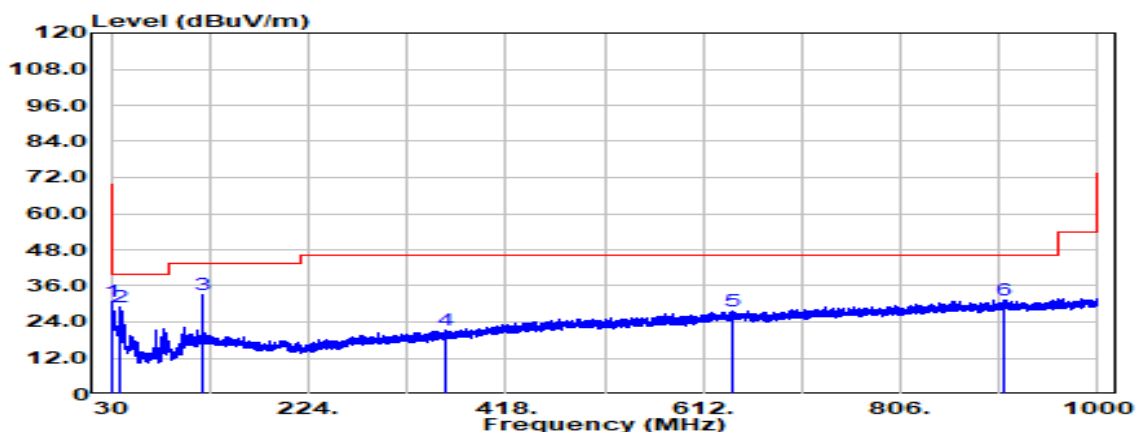
Ver.

Temperature: 21.1°C**Test Date:**

April 8, 2022

Humidity: 51% RH**Tested by:**

Ray Li



Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBμV)	Factor (dB)	Actual FS (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Ant. Pol. (V/H)
31.334	Peak	34.39	-3.62	30.77	40.00	-9.23	V
38.973	Peak	38.27	-9.27	29.01	40.00	-10.99	V
119.968	Peak	42.42	-9.39	33.03	43.50	-10.47	V
358.951	Peak	28.54	-7.39	21.15	46.00	-24.85	V
639.888	Peak	28.30	-0.80	27.50	46.00	-18.50	V
908.820	Peak	28.14	3.07	31.21	46.00	-14.79	V

Remark:

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBUV/m) – Quasi-peak limit (dBUV/m).

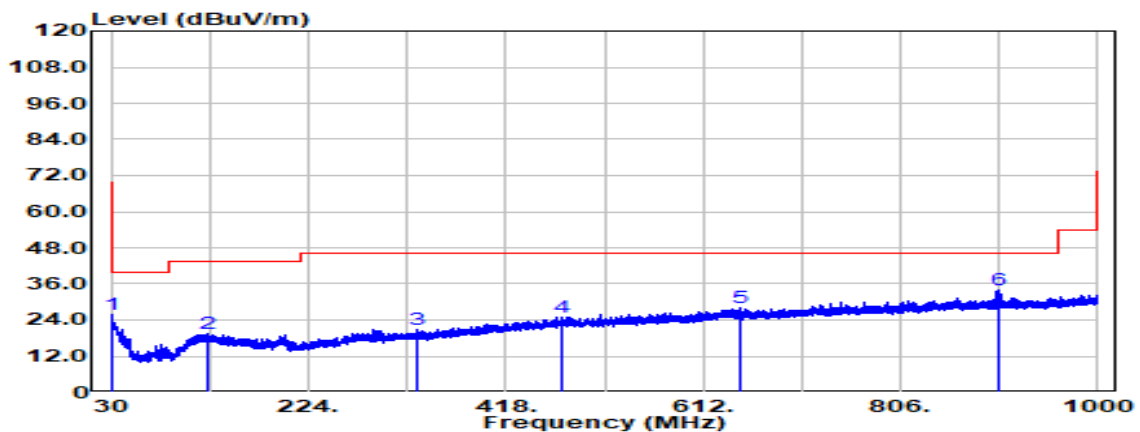
Operation Mode: Normal Link

Polarity: Hor.

Temperature: 21.1°C

Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li


Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBμV)	Factor (dB)	Actual FS (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Ant. Pol. (V/H)
30.364	Peak	28.65	-2.93	25.72	40.00	-14.28	H
124.211	Peak	29.01	-9.41	19.60	43.50	-23.90	H
331.064	Peak	28.97	-8.24	20.73	46.00	-25.27	H
472.926	Peak	28.88	-3.81	25.07	46.00	-20.93	H
647.284	Peak	28.75	-0.80	27.95	46.00	-18.05	H
902.273	Peak	31.01	2.88	33.89	46.00	-12.11	H

Remark:

- No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
- Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
- Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Margin (dB) = Remark result (dBUV/m) – Quasi-peak limit (dBUV/m).



Report No.: TMWK2203001095KR

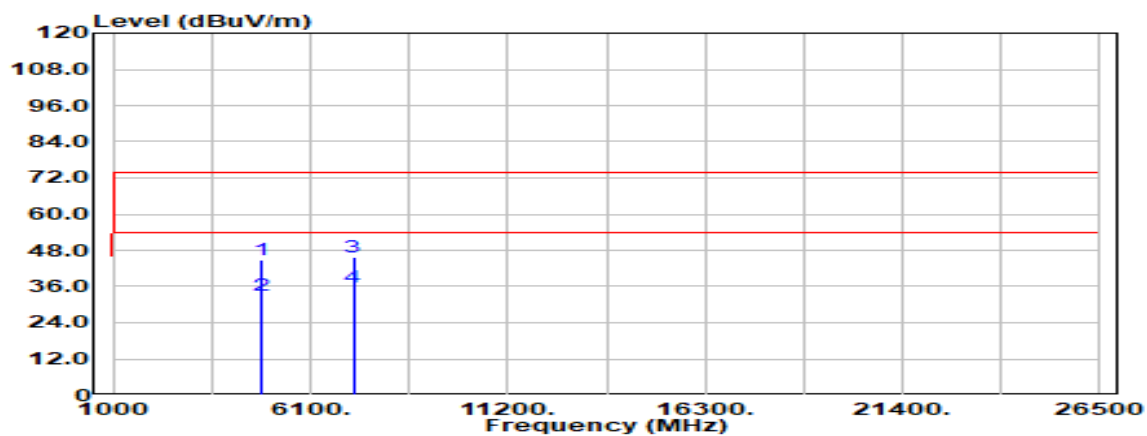
Page: 32 / 39

Rev.: 00

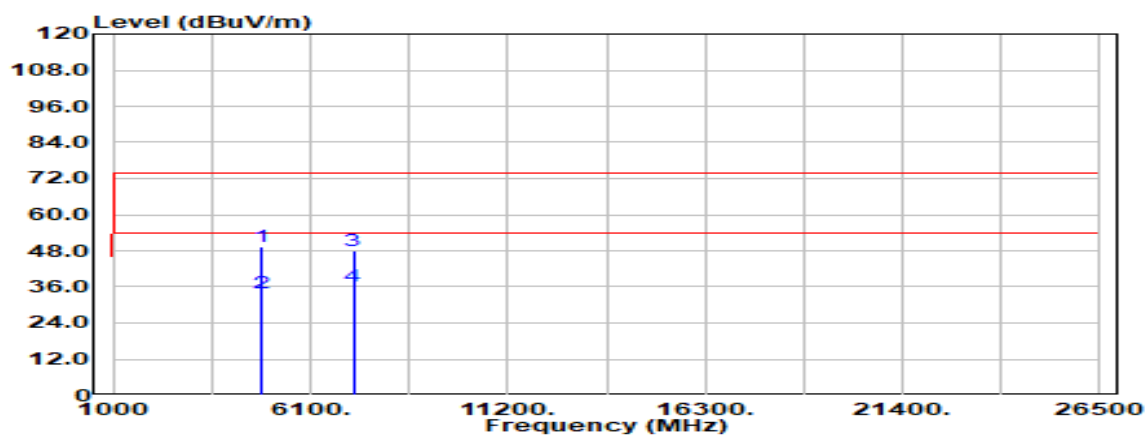
Above 1 GHz

TX / CH Low

Polarity: Vertical



Polarity: Horizontal



Operation Mode: TX CH Low

Polarity: Ver. / Hor.

Temperature: 21.1°C

Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

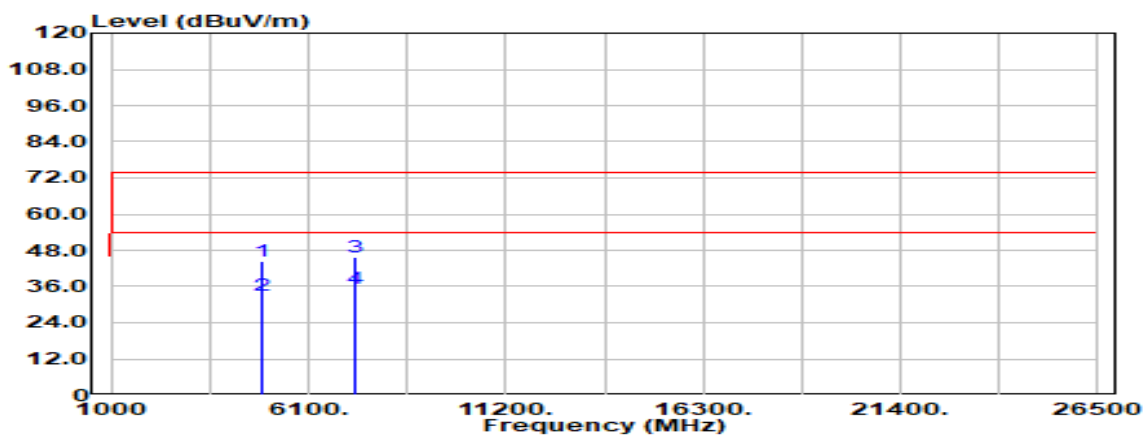
Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBμV)	Factor (dB)	Actual FS (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Ant.Pol. (V/H)
4804.000	Peak	35.50	9.46	44.96	74.00	-29.04	V
4804.000	Average	23.62	9.46	33.08	54.00	-20.92	V
7206.000	Peak	32.08	13.51	45.59	74.00	-28.41	V
7206.000	Average	22.40	13.51	35.91	54.00	-18.09	V
N/A							
4804.000	Peak	39.76	9.46	49.23	74.00	-24.77	H
4804.000	Average	24.36	9.46	33.82	54.00	-20.18	H
7206.000	Peak	34.56	13.51	48.07	74.00	-25.93	H
7206.000	Average	22.67	13.51	36.18	54.00	-17.82	H
N/A							

Remark:

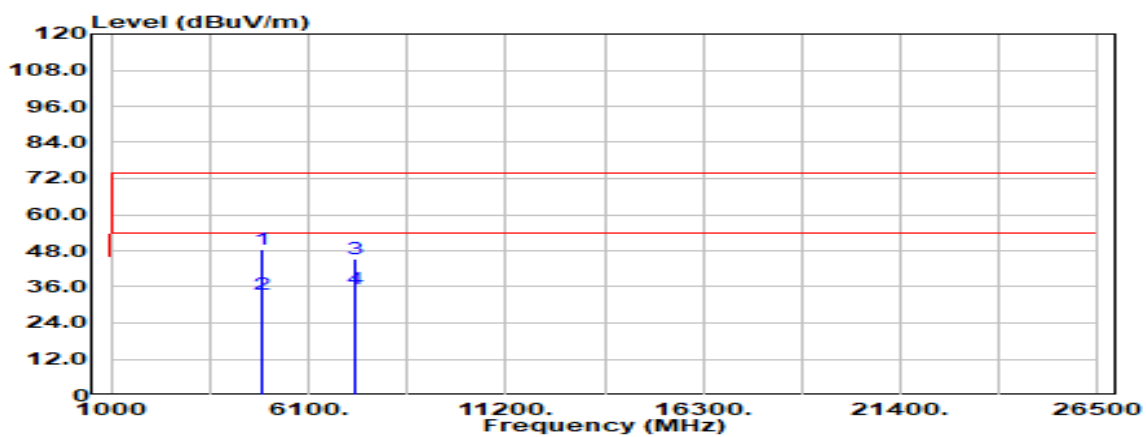
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Result (dBuV/m) – limit (dBuV/m).

TX / CH Mid

Polarity: Vertical



Polarity: Horizontal



Operation Mode: TX CH Mid

Polarity: Ver. / Hor.

Temperature: 21.1°C

Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

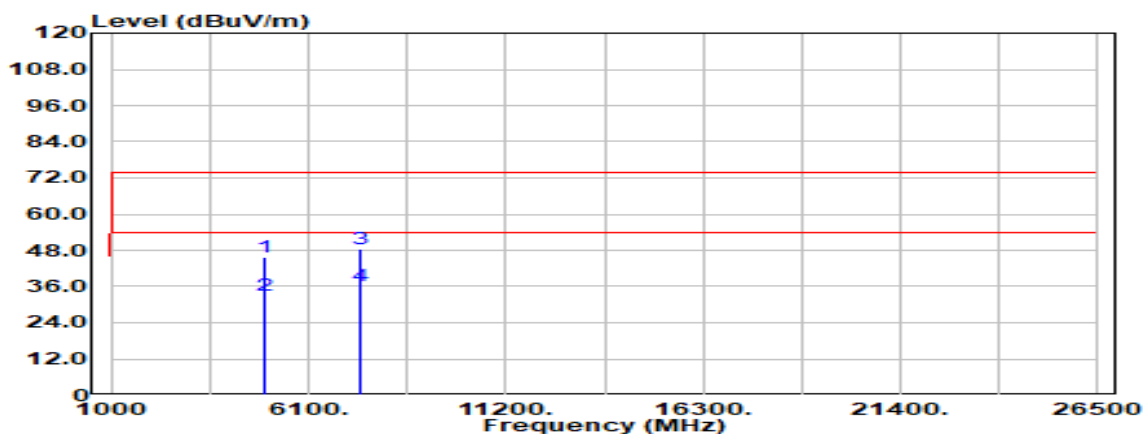
Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBμV)	Factor (dB)	Actual FS (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Ant.Pol. (V/H)
4880.000	Peak	34.58	9.59	44.17	74.00	-29.83	V
4880.000	Average	23.44	9.59	33.03	54.00	-20.97	V
7320.000	Peak	32.66	13.24	45.90	74.00	-28.10	V
7320.000	Average	22.00	13.24	35.24	54.00	-18.76	V
N/A							
4880.000	Peak	38.78	9.59	48.37	74.00	-25.63	H
4880.000	Average	23.88	9.59	33.47	54.00	-20.53	H
7320.000	Peak	32.03	13.24	45.27	74.00	-28.73	H
7320.000	Average	22.14	13.24	35.38	54.00	-18.62	H
N/A							

Remark:

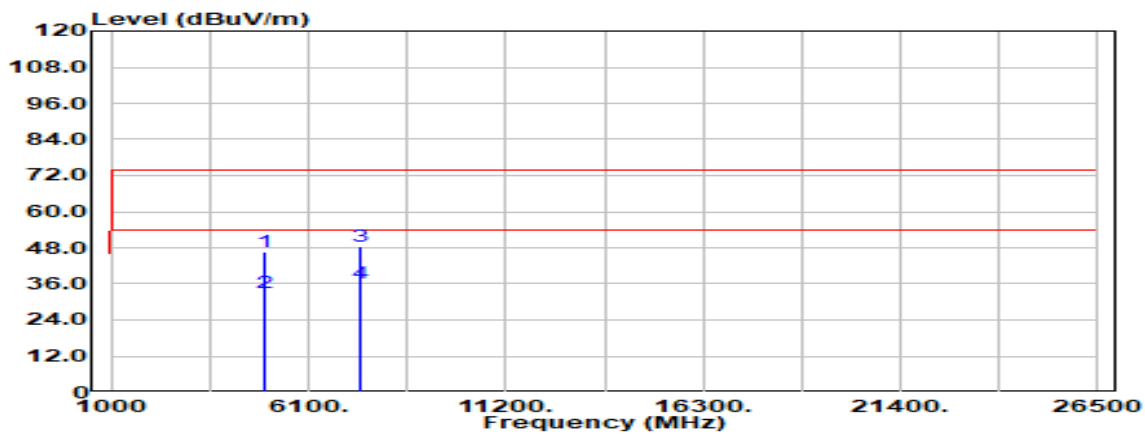
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Result (dBuV/m) – limit (dBuV/m).

TX / CH High

Polarity: Vertical



Polarity: Horizontal



Operation Mode: TX CH High

Polarity: Ver. / Hor.

Temperature: 21.1°C

Test Date: April 8, 2022

Humidity: 51% RH

Tested by: Ray Li

Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBμV)	Factor (dB)	Actual FS (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Ant.Pol. (V/H)
4960.000	Peak	35.89	9.71	45.60	74.00	-28.40	V
4960.000	Average	23.18	9.71	32.89	54.00	-21.11	V
7440.000	Peak	34.74	13.54	48.28	74.00	-25.72	V
7440.000	Average	22.48	13.54	36.02	54.00	-17.98	V
N/A							
4960.000	Peak	37.05	9.71	46.76	74.00	-27.24	H
4960.000	Average	23.41	9.71	33.12	54.00	-20.88	H
7440.000	Peak	34.86	13.54	48.40	74.00	-25.60	H
7440.000	Average	22.66	13.54	36.20	54.00	-17.80	H
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Result (dBuV/m) – limit (dBuV/m).

8.4 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

Test Configuration

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Not applicable, because EUT not connect to AC Main Source direct.

- End of Test Report -